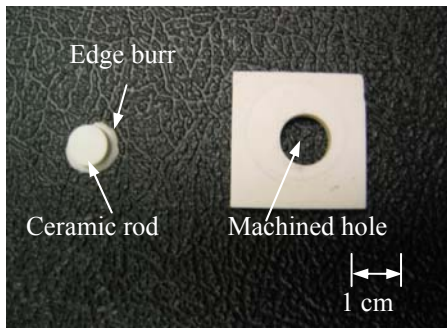
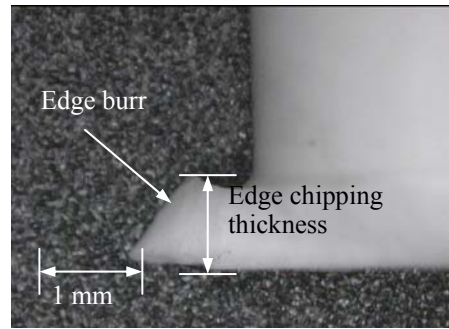


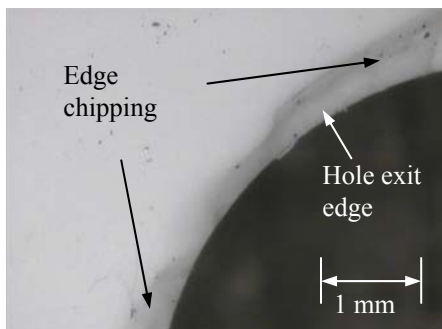
Fig. 1. Illustration of rotary ultrasonic machining (RUM).



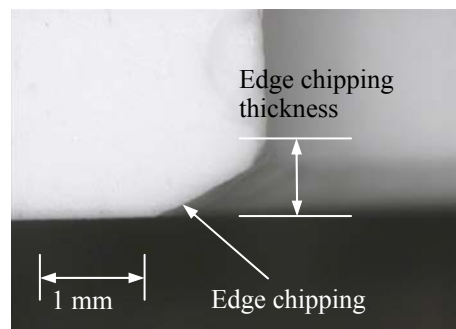
(a) Two parts resulting from RUM



(b) Side view of machined rod

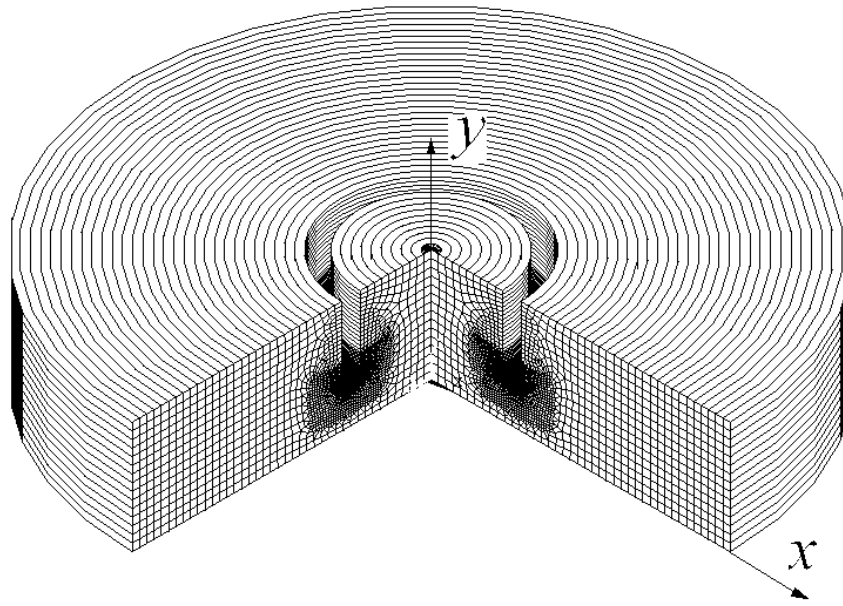


(c) Bottom view of hole exit

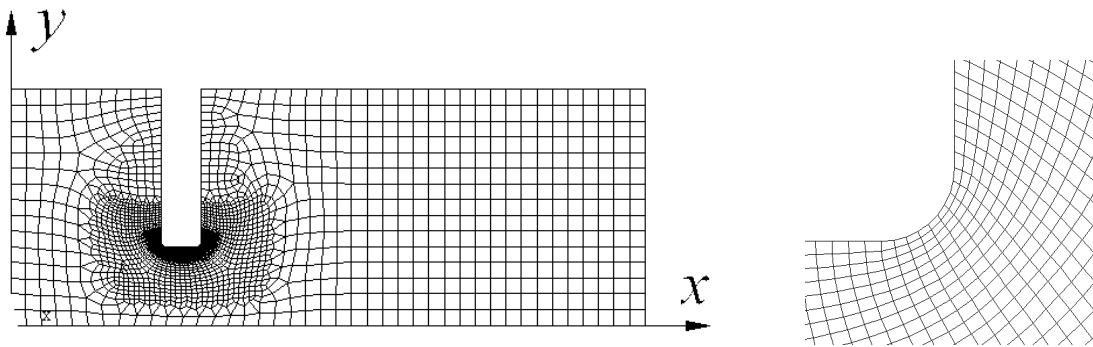


(d) Side view of hole exit

Fig. 2. Edge chipping induced by RUM.



(a) Overview in 3-D coordinates



(b) Overview in 2-D coordinates

(c) Around the edge chipping initiation region

Fig. 3. Mesh design for the FEA model.

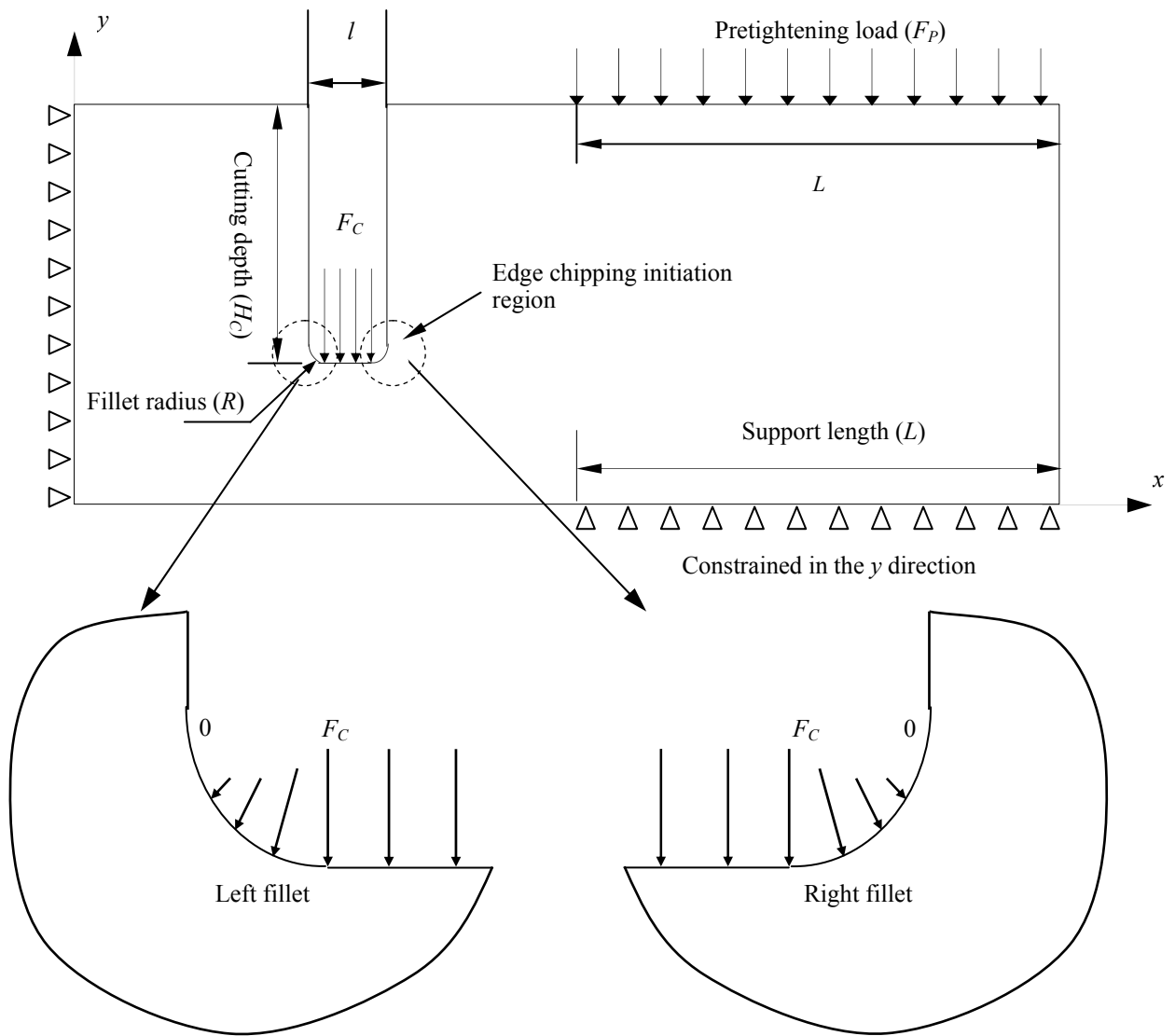
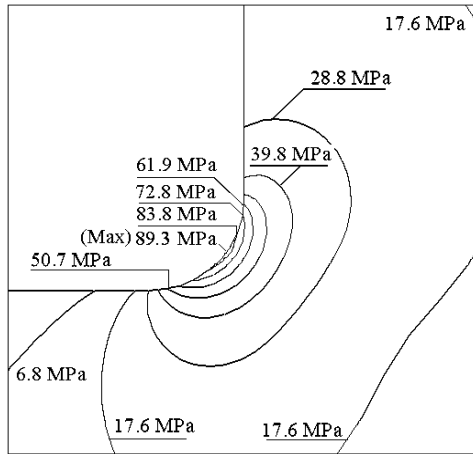
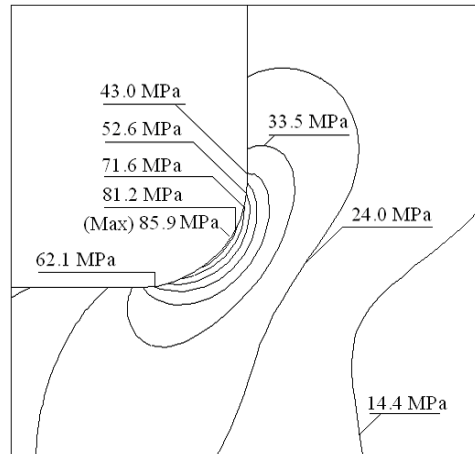


Fig. 4. Boundary conditions and applied loads for the FEA model.



(a) Maximum normal stress



(b) von Mises stress

Fig. 5. Contour plots of stress distributions.

( $H_C = 5 \text{ mm}$ ;  $L = 8 \text{ mm}$ ;  $F_P = 3.7 \text{ MPa}$ )

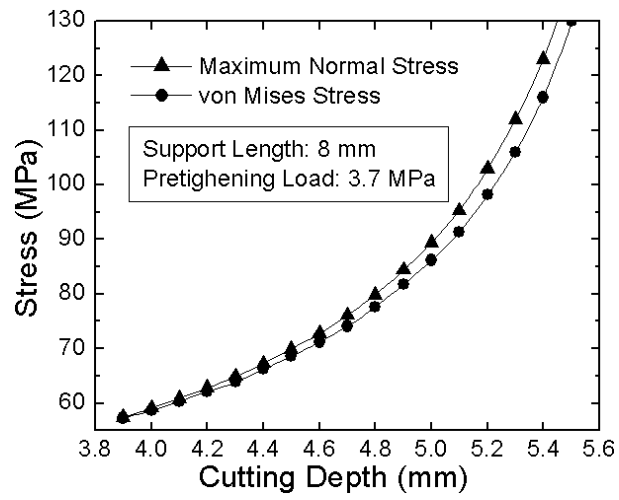


Fig. 6. Effects of cutting depth on the maximum stress values.

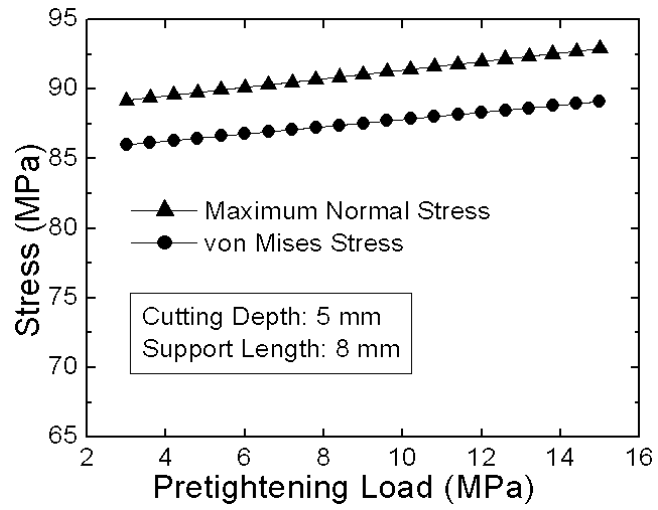


Fig. 7. Effects of pretightening load on the maximum stress values.

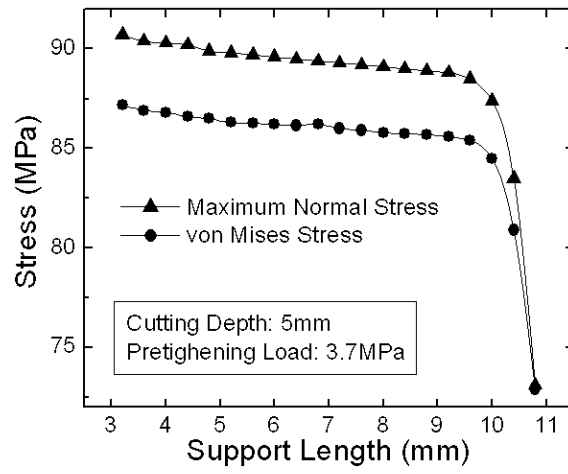


Fig. 8. Effects of support length on the maximum stress values.



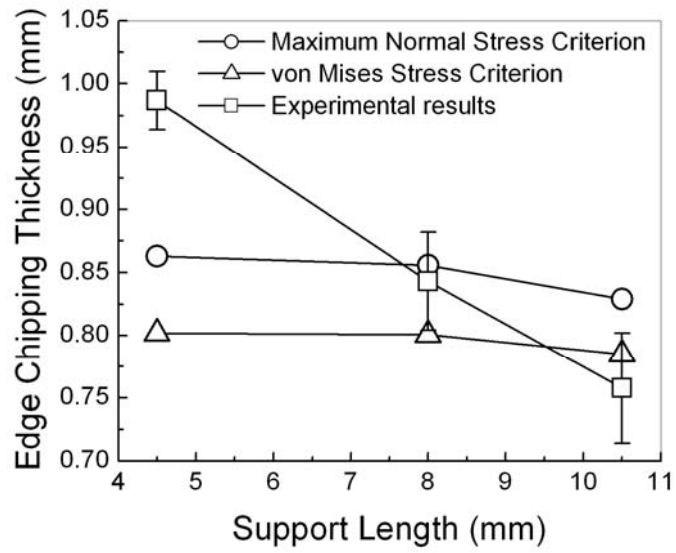


Fig. 9. Predicted and experimental results for the effects of support length on edge chipping thickness.

( $F_P = 3.7$  MPa and  $F_C = 15$  MPa for the FEA simulations. Experimental conditions are shown in Table 2.)